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Genotypic and Environmental Variation in the Nutritional and Phenolic Antioxidant Properties of Pakistani Wheat (*Triticum aestivum* L.) Varieties

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Abstract

Wheat variety and environment have a great impact on nutrient composition and are of great importance for both food and environment quality. The objective of this study was to determine the effects of variety and growing environment on the nutritional composition, phenolic contents and antioxidant activities from commercial wheat cultivars grown in Pakistan. Chemical composition, total phenolic contents and antioxidant activities were measured in twenty-seven spring wheat varieties grown for two cropping years. Preliminary assessment of antioxidant strength of the extracts was carried out by the evaluation of total phenolic contents (TPC), antioxidant activity (AA) and free radical scavenging activity (FRSA). The grain length, grain width and thousand kernel weight of different wheat varieties ranged from 6.75–6.77mm, 3.44–3.45mm and 42.95–45.16g respectively among different wheat varieties. Similarly, the moisture content, ash content, crude fat content, crude fiber content, crude protein content, wet gluten content, dry gluten content, flour gliadins content, flour glutenins content and SDS-Sedimentation value varied from 10.23–10.61 %, 1.47–1.48 %, 1.16–1.21 %, 1.37–1.40 %, 11.86–12.02 %, 25.39–25.46 %, 8.85–8.87 %, 0.46–0.52 %, 0.46–0.49 % and 24.99–25.85ml respectively among different wheat varieties. Likewise, iron (Fe), zinc (Zn), manganese (Mn), copper (Cu), sodium (Na), potassium (K), calcium (Ca), magnesium (Mg) and phosphorus (P) content ranged from 31.73–32.21 mg/kg, 38.57–38.60 mg/kg, 19.44–19.76 mg/kg, 3.73–3.88 mg/kg, 45.19–46.90 mg/kg, 3900.2–3983.1 mg/kg, 361.28–376.30 mg/kg, 1291.9–1301.2 mg/kg and 3029.3–3091.4 mg/kg respectively among different wheat varieties. In the same way, the results for total phenolic contents, free radical scavenging activity (DPPH assay) and antioxidant activity via Beta Carotene bleaching assay varied from 12.40–11.73mg GE/g, 18.48–18.99 % and 14.23–15.97 % respectively. Our research clearly indicated that wheat variety, input conditions, environmental and genotypic variations have effect on the phenolic antioxidant properties.

Keywords: Environmental Variation, genotypic Variation, Phenolic Antioxidant Properties, Wheat Varieties